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ABSTRACT

This report addresses the question of whether culturally specific strategies are an effective means for literacy instruction, and how a culturally specific computer-based architecture, the "Lyric Reader," takes advantage of children's existing knowledge and experience to motivate them to read. Given the reading difficulties experienced by many American children and the increasing diversity of the nation's student population, educators are recognizing that reading instruction must take advantage of the knowledge and experiences that individual children bring to the classroom. The report describes a computer-based architecture entitled "Lyric Reader" that combines reading strategies, motivating activities, and personalized guidance with popular rap music and children's song lyrics to present contextualized reading instruction--exemplified by two of its applications, "Rappin' Reader" and "Say Say Oh Playmate." The two are contrasted to show how "Lyric Reader" facilitates pedagogically consistent but contextually unique environments for beginning readers. A third application, "Nursery Rhyme Reader," is under development, as is a tool suite that will allow non-programmers to develop new "Lyric Reader" programs, tasks, and content. Includes 8 figures, 9 tables, and 5 notes. (Contains 18 references.) (NKA)

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CIERA REPORT

Lyric Reader: Creating Intrinsically Motivating and Culturally Responsive Reading Environments

Nichole Pinkard
University of Michigan

U.S. DEPARTMENT OF EDUCATION
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CIERA REPORT #1-013
August 21, 2001

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CS 014 559

LYRIC READER: CREATING INTRINSICALLY MOTIVATING AND CULTURALLY RESPONSIVE READING ENVIRONMENTS

CIERA REPORT #1-013

Nichole Pinkard
University of Michigan

CIERA Inquiry 1: Readers and Texts
Are culturally specific strategies an effective means for literacy instruction? How does a culturally specific computer-based architecture—the *Lyric Reader*—take advantage of children's existing knowledge and experience in order to motivate them to read?

Given the reading difficulties experienced by many American children and the increasing diversity of the country's student population, educators are recognizing that reading instruction must take advantage of the knowledge and experiences that individual children bring to the classroom. The author describes a computer-based architecture entitled *Lyric Reader* that combines reading strategies, motivating activities, and personalized guidance with popular rap music and children's song lyrics to present contextualized reading instruction—exemplified by two of its applications, *Rappin' Reader* and *Say Say Oh Playmate*. The two are contrasted to show how *Lyric Reader* facilitates pedagogically consistent but contextually unique environments for beginning readers.

Center for the Improvement of Early Reading Achievement
University of Michigan – Ann Arbor

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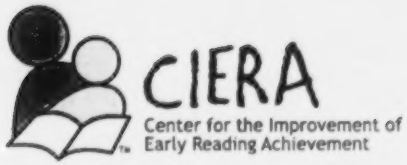

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LYRIC READER: CREATING INTRINSICALLY MOTIVATING AND CULTURALLY RESPONSIVE READING ENVIRONMENTS

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Introduction

Reading difficulties in the U.S. are particularly acute among minority children. Data from the National Assessment of Educational Progress indicate that African-American and Latino children are far more likely than white children to experience significant difficulties in learning to read (Campbell et al., 1996).

Research has shown that children comprehend text better when they have prior knowledge of the topic being discussed (Rumelhart, 1980; Schank, 1977; Seidenberg & McClelland, 1989; Spiro, 1980). Theoretical approaches to literacy instruction—e.g., whole language (Goodman, 1967) and literature-based—have been established on the principle that children learn to read more effectively if words are embedded in meaningful text. The "meaningful" concept has many aspects, including culture; culturally related differences in prior knowledge may help explain why minority children have trouble learning to read.

Motivation is another key determinant of reading success (Eccles & Wigfield, 1995; Guthrie & Alao, 1997; Oldfather and Wigfield, 1996), and a student's interest in the material being read has a strong impact on motivation (Gambrell & Morrow, 1996). Contextualized reading instruction (instruction tailored to the interests and prior knowledge of each student) may enhance motivation, and therefore improve a child's reading ability.

A common component of reading instruction is the recognition of frequently occurring sight words. Children learn that written symbols correspond to words in their oral vocabulary, but the ease with which children make those connections varies due to such factors as speaking a foreign language as a first language or using an English dialect such as Black English

Vernacular. Ideally, all schools should use teaching materials and methods that allow students to encounter words, phrases, and ideas from their own oral language experiences. Unfortunately, few such culturally relevant and contextualized reading materials exist; even if they did, many teachers would find it challenging and time-consuming to select culturally responsive reading materials given the diversity of languages and cultures found in contemporary classrooms.

As an efficient means of using culturally responsive materials, computer-based learning environments allow teachers to give contextualized reading instruction to diverse student populations. The technology also allows students to use aural and orthographic input to develop beginning literacy skills. In this paper I will describe one such environment: *Lyric Reader*, which combines established reading strategies, intrinsically motivating activities, and texts drawn from the cultural experiences of minority populations. The software package includes a tool suite that enables untrained programmers to develop their own *Lyric Reader* applications.

Lyric Reader Applications

Rappin' Reader

Rappin' Reader[1], an interactive multimedia application, draws on students' familiarity and fascination with music to engage them in the task of writing songs for their favorite recording artist or group. A user's first assignment is to serve as the "Junior Writer" for their chosen artist or group. Fulfilling the responsibilities of that position entails finding missing words, unscrambling lyrics, and adding correct words to incomplete phrases. These tasks require the knowledge of lyrics to songs that are commonly known by children from different backgrounds.

After demonstrating their ability to read the words of a song, users are promoted to the position of "Head Writer." As head writers, children must use their creativity to write song parodies, then audition to become rappers for the recording studio. The audition requires the making of a music video using computer graphics and original lyrics that the students write and record themselves. The final product is a synchronized video of their written lyrics, sung lyrics, and graphics. Screens shots are presented in Figures 1–4 (interested readers are also directed to the Lyric Reader website, at http://www.umich.edu/~medal/ssopmweb/ssop.html, where they can view clearer images and download the software).

Figure 1. Reconstructing lyrics. The user is given the task of completing sentences by finding the missing words.

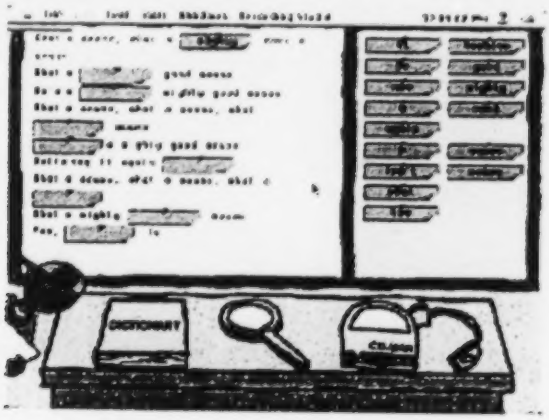

Figure 2. Unscrambling sentences. The user is asked to unscramble sentences whose words were dropped on the way to the printer.

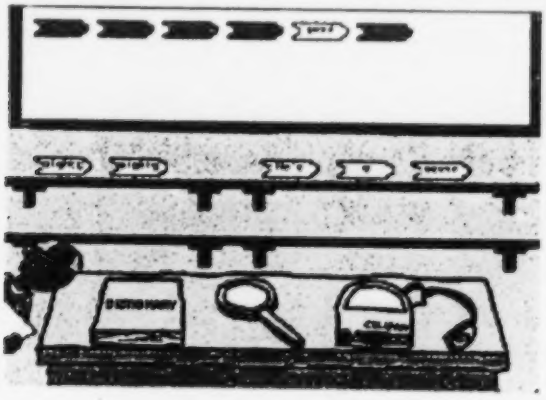

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Figure 3. Creating a new song. The user is given the task of creating a music video for an audition with the recording studio's president.

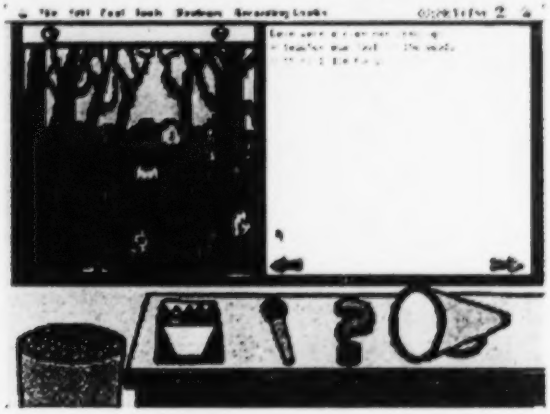
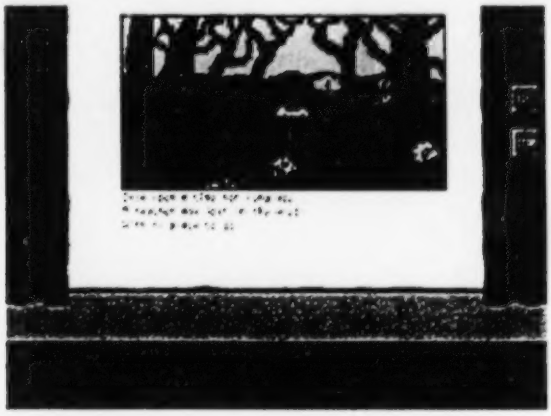


Figure 4. Video premiere. The user's lyrics, pictures, and recorded rap are synchronized and shown to the boss and talent search committee.



Rappin' Reader was designed for children who listen to rap songs and who may dream of or aspire to becoming rappers. While children from all ethnic and income groups listen to rap music, a large percentage of aficionados are low-income African-American males. The interface was customized accordingly.

Say Say Oh Playmate

Say Say Oh Playmate[2] takes advantage of the *Lyric Reader* architecture to incorporate other types of music into the *Rappin' Reader* concept. Instead of contemporary rap songs, *Say Say Oh Playmate* uses clap routines such as "Miss Mary Mack" that have been passed down through many generations and are well-known in African-American communities. Similar to *Rappin' Reader*, the application uses oral language as a scaffold for acquiring sight vocabulary.

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Students are invited by an animated leader named Samantha to join a clapping group in a fictitious neighborhood. "Sam," who serves as a guide throughout the application, asks students to teach a clap routine to a younger group of animated kids. To do so, the student must assemble the song's lyrics and assign the correct clap to each word. Students learn how to clap unfamiliar routines by practicing with Sam. Screens taken from the *Say Say Oh Playmate* application are presented in Figures 5–8.

Figure 5. Reconstructing lyrics. The user reconstructs the lyrics to "Miss Mary Mack."

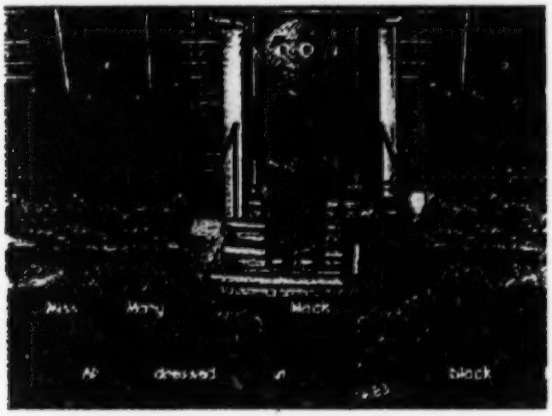

Figure 6. Reconstructing a clap routine. The user reconstructs the clap pattern to "Miss Mary Mack."

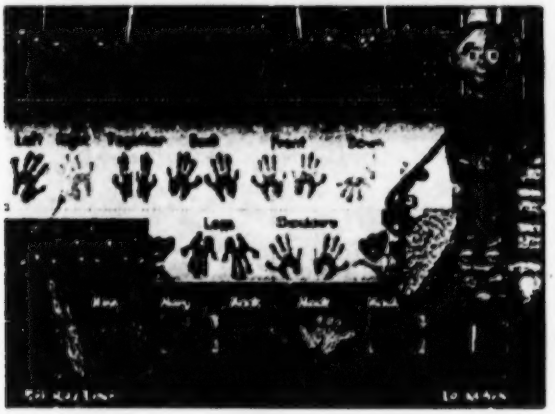

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Figure 7. Writing original lyrics. The user learns the clap pattern to "Miss Mary Mack."

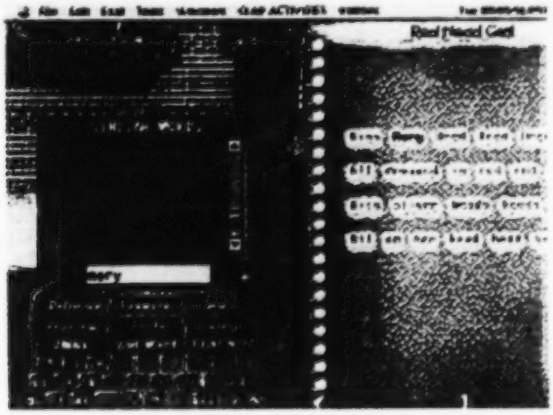
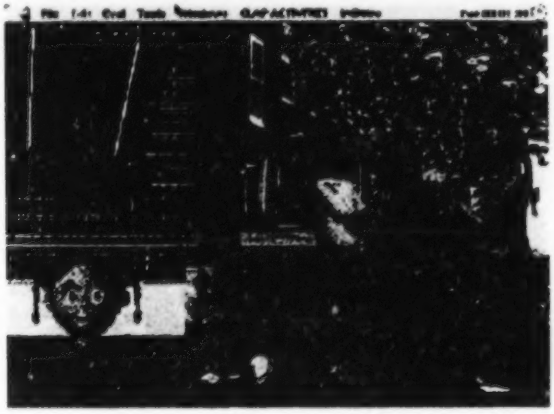


Figure 8. Watching clap routine performance. The user watches her completed routine performed by the animated girls.



The system has eight songs and a dictionary containing over 1,400 words. For advanced readers, the system can be used as a tool for creating new lyrics and clap routines; users are given the power to create routines from scratch or to modify existing routines.

Formative Evaluations of the Applications

The research questions used to perform formative evaluations of the two applications were a) Do Rappin' Reader and Say Say Oh Playmate help children increase their sight vocabulary? and b) Are the two applications capa-

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ble of motivating children who dislike reading to perform activities that rely heavily on their reading skills?

Rappin' Reader

The three sites chosen for evaluating the Rappin' Reader application were two after-school centers for low-income African-American children and a computer lab in a private university's dormitory for MBA students. Pre- and posttest results show that 100% of the students using Rappin' Reader experienced an increase in sight words during each 70-minute session. The average gain for all children was 7.3 new words per session; second-grade children had the biggest average gain of 7.95 new words per session. Differences were noted between African-American and Caucasian children. At all grade levels, the latter's pre- and posttest scores were higher than those of the former, but the African-American children experienced a greater percentage gain (19% versus 13% for Caucasian children).

Say Say Oh Playmate

The site for testing this application was an after-school mentoring/tutoring program for children living in a housing project located in a large midwestern city. Pairs of children used Say Say Oh Playmate for two 90-minute sessions. Pre- and posttest scores show that all of the participating children made gains in word recognition, from an average of 17 out of 41 (41%) to an average of 26.7 out of 41 (65%) at the end of a single session—a gain of 9.7 words (24%).

The motivational effect of Say Say Oh Playmate was evaluated by asking children during post-testing interviews to name their three favorite software titles from a list of applications available in the tutoring program's computer lab. Say Say Oh Playmate received all 12 first-place votes, suggesting that these children were motivated to continue using the program.

Lyric Reader Architecture

Rappin Reader and Say Say Oh Playmate use Goal-Based Scenarios (GBSs) that encourage students to pursue well-defined goals in a learning-by-doing environment (Schank, 1992; Schank, Fano, Bell & Jona, 1993). For a GBS to be successful, it is important that the assigned goals be intrinsically interesting. If they are, the students will be motivated to pursue those goals and consequently learn the skills the program is designed to teach. In the Lyric Reader architecture, consistent instruction and intrinsic motivation is achieved via interactions among:

1. the pedagogical framework, responsible for providing the instructional core by linking all of the Lyric Reader systems. It also ensures that children who use the different Lyric Reader applications will receive similar instruction. The pedagogical framework can be thought of as the engine of a car.

2. the contextual framework, responsible for personalizing Lyric Reader applications for target audiences. The contextual framework can be thought of as a car's body and accessories.

3. the Word Recognition Tutor, responsible for providing orthographic guidance.

Pedagogical Framework

The pedagogical framework for the Lyric Reader system is based on Seidenberg and McClelland's (1989) model of how children learn to read (see also Adams, 1990). The framework uses children's existing oral language—in the form of contextual, meaning, and phonemic knowledge—as a scaffold to build sight vocabulary. The interaction between the task framework and the Word Recognition Tutor helps create the framework's instructional consistency and guidance.

Task Framework

The organization of activities for scaffolding the process of adapting oral vocabulary into sight vocabulary constitutes the task framework. Activity design was based on a constructivist philosophy—that is, children are challenged to construct songs that reflect their existing oral language. The product (correctly organized lyrics) requires that new connections be established between phonological and orthographic word representations. Users may not always understand the meanings of the words they encounter, but Lyric Reader helps by allowing them to hear, see, and use each word in a lyric. Students are also given support in constructing word meanings via definitions and sample sentences that are provided for every word in the program's dictionary.

Table 1 presents a list of activities included in each Lyric Reader application to help children achieve three major goals while reconstructing or creating a song: a) adding the words of a song to their sight vocabulary, b) practicing their creative writing skills, and c) learning the meaning and use of unfamiliar words.

According to Schank (1977) the experience of expectation failures can be used to help beginning readers improve their sight vocabulary. The users of Lyric Reader applications are encouraged to use their knowledge of song lyrics to reconstruct them in instances when incorrect lyrics are presented. The application provides specific word recognition help when users notice their own mistakes, and focuses their attention on the task of correction.

Table 1: Task Framework Units

Unit	Objective
Listen	To start the child thinking about connections between oral and written language. In addition, this section provides an opportunity for children who are not familiar with a song to spend time learning it (the Lyric Reader system assumes that the child has baseline knowledge of the song's lyrics).
Reconstruct	To have children use their knowledge of a song to reconstruct its lyrics and to add its words to their sight vocabulary.
Construct	To have children a) connect reading and writing skills, and b) learn new words by creating an original song. A pre-specified list of 1,400 words (searchable by spelling, rhyme pattern, and category) is available to students for this task.
Perform	To allow children to show their work to others—parents, teachers, and other children—for comments and praise.

Figure 9 shows the Lyric Reader process for creating a learning cycle that helps users recover from expectation failures. As children move through the cycle, their progress is dependent upon such factors as their reading skills and song familiarity—in other words, scaffolding strategies are used to give students the phonological and orthographic guidance necessary to complete each step. Above-average readers who are unfamiliar with a song will need different scaffolding assistance than struggling readers who are very familiar with the same song. The scaffolding strategies are part of a Word Recognition Tutor that helps all types of readers make their way through the learning cycle.

Word Recognition Tutor

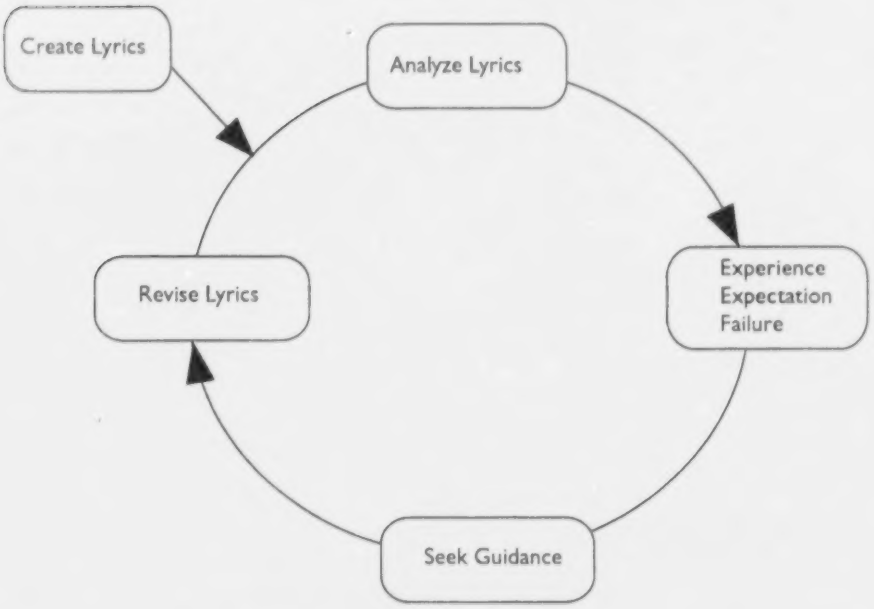
The major objective of all Lyric Reader applications is to provide just-in-time, individualized, contextualized guidance. The Word Recognition Tutor uses a listen-and-track method of monitoring and correcting a user's errors to provide meaningful guidance for problem solving. During in-person tutoring sessions, children's reading mistakes can be caught and attended to when they read aloud. The means for computers to "listen" to students' oral reading efforts are still insufficient for the purposes of automated monitoring and error classification, but reading can be monitored indirectly. For example, the act of putting together the lyrics to a song produces visible patterns that allow the Word Recognition Tutor to monitor progress and to provide meaningful contextualized guidance. The general guidance strategies of the Word Recognition Tutor are:

1. Help children detect errors. The goal of this strategy is to develop children's ability to self-monitor while reading. Lyric Reader does this by requiring that children stop and listen to their work in order to detect their own errors. The use of aural skills to determine whether or not they have correctly constructed a lyric is very effective when distinguishing between such words as "Miss," "Mary," and "Mack," but is less effective for distinguishing between such words as "hare" and "hair."

2. Focus children's attention on errors. When children are unable to find their own mistakes by listening to a song, the Word Recognition Tutor uses a second strategy of visually and verbally highlighting the work they did correctly, thereby indirectly focusing their attention on incorrect words.

3. Give children word recognition hints. In situations where a user needs specific orthographic guidance, Lyric Reader provides help in the form of spelling by analogy, attending to onset and rime[3] (Goswami, 1986, 1990,1992), and focusing on morphemic elements—all well-established strategies that are described in detail in Pinkard (1998).

Figure 9: Diagram of Lyric Reader Learning Cycle



A Typical Word Recognition Tutoring Session

Tables 2-4 contain excerpts from transcripts of a Say Say Oh Playmate session; the user is an African-American first-grade student whose pseudonym is Vernae. The excerpts illustrate Vernae's efforts while reconstructing the lyrics to the song/clap routine "Miss Mary Mack." In Table 2, she has just attempted to reconstruct the phrase "Miss Mary Mack Mack Mack/all dressed in black black black"; Sam (the animated character who represents the program's Word Recognition Tutor) uses all three of the tutoring strategies described above to help Vernae learn the difference between "back" and "black." Sam offers to give Vernae guidance in finding the correct word, but it is her decision whether or not to accept the guidance.

Table 2: Excerpt A: The Tutor Helps Vernae Detect an Error

- Sam: "You should click on the microphone to listen to what you have written so far."
- Vernae clicks on the microphone.
- Sam: "Okay, here goes your song!"
- Sam (singing): "Miss Mary Mack Mack Mack all dressed in back."

The tutor uses the error detection strategy when suggesting that Vernae should listen to her work. Each time a user inserts a word, the system checks to see if at least one-half of the empty spaces on the screen have been filled. At that point, if one or more spaces have been filled incorrectly, the tutor tells the user that clicking on the microphone will cause Sam to sing what has been constructed so far. This feature assumes that users will notice discrepancies between their efforts and the correct lyrics.

Table 3: Excerpt B: The Tutor Gives Vernae a Hint

Unit	Objective
Listen	To start the child thinking about connections between oral and written language. In addition, this section provides an opportunity for children who are not familiar with a song to spend time learning it (the Lyric Reader system assumes that the child has baseline knowledge of the song's lyrics).
Reconstruct	To have children use their knowledge of a song to reconstruct its lyrics and to add its words to their sight vocabulary.
Construct	To have children a) connect reading and writing skills, and b) learn new words by creating an original song. A pre-specified list of 1,400 words (searchable by spelling, rhyme pattern, and category) is available to students for this task.
Perform	To allow children to show their work to others—parents, teachers, and other children—for comments and praise.

In the next excerpt, Vernae decides to accept guidance in the form of a hint from the sidewalk square containing the word "back." Her action suggests that even though she recognizes that a mistake has been made, she does not know how to correct the error. The hint consists of a limited group of word choices: Mack, back, and black.[4]

Vernae correctly fills two of the empty spots with "black," but later in the session she once again uses the word "back" incorrectly. The tutor immediately suggests that Vernae check her work (the focus attention strategy), and gives her a visual clue that the only incorrect sidewalk square is the one containing the word "back." She responds to the prompt by erasing the incorrect word and dropping the correct one onto the empty sidewalk square. When Vernae checks her work again, Sam tells her that everything is perfect. The program-generated feedback not only gives a visual cue as to what is correct (indirectly implying mistakes), it lets users know they are making progress.

Table 4: Excerpt C: The Tutor Focuses Vernae's Attention on Her Error

- Sam: "Click on the eraser and then go to the word you want to erase and click again. The word you erase will disappear."
- Vernae a) clicks on the eraser to remove the word "back"; b) clicks on the leaf containing the word "black" and drops it on the newly emptied sidewalk square; c) clicks on the same leaf containing the word "black" and drops it on the next empty sidewalk square; and d) clicks on the leaf containing the word "back" and drops it on the next empty sidewalk square.
- Sam: "You should click on the chalk and I will check your work."
- Vernae clicks on the chalk.
- Sam (singing): "Miss Mary Mack Mack Mack, all dressed in black black back."
- Sam: "Great! I wrote in chalk the words you got right. The leaves that are left don't sound exactly like the song you picked. See if you can figure out what's wrong."
- Vernae clicks on the eraser to remove the word "back," then clicks on the leaf that has the word "black" and drops it on the newly emptied sidewalk square.
- Sam: "Things look pretty good, click on the chalk and I'll check your work."
- Vernae clicks on the chalk.
- Sam (singing): "Miss Mary Mack Mack Mack, all dressed in black black black."
- Sam: "All right, you got it! You're finished with this part of the song. I'll clear the sidewalk for the next part of the song."

Personalizing Guidance

A primary strength of the Word Recognition Tutor is its use of the three strategies to provide individual, contextualized prompts. Thus, if one child mistakes "mother" for "missed" while another child mistakes "hissed" for "missed," both receive personalized hints that allow for appropriate scaffolding to occur. Hints allow users to decide whether or not their answers are correct; depending on the users' responses, guidance may be offered in the form of a) commonalties between a guess and the correct word (e.g., the /m/ in "missed" and "mother")—the goal being to help children understand why their choices were wrong and to make them aware of incorrect word segments that are shared with the correct word, or b) hints based on the child's prior sight vocabulary. Whenever possible, existing word knowledge (based prior correct word spellings saved by the system) is used to help users learn new words. How word recognition strategies are used can only be determined during "run time," since every child's word repertoire changes over time.

Hints Based on Word Commonalties

The Word Recognition Tutor uses positive language to praise users when they make correct choices and to encourage them to resolve errors. When students select a correct word, Sam tells them

> "There is no need to give you a clue because you have the correct word."

If a wrong choice is made, Sam says

> "Hey, the word you chose, _____, is wrong."

The tutor then constructs a hint based on commonalties between the student's guess and the correct word—for example, determining whether both words can be parsed into similar onsets and rimes. If this is the case, Sam says

> "Hey, the word you chose, _____, is wrong, but it does have the same beginning sound (onset) and spelling (onset letters) as the missing word."

or

> "but it does have the same ending sound (rime) and spelling (rime letters) as the missing word.

In Vernae's case the hint was:

> "The word you have selected (back) is wrong, but it does contain the same ending sound (ack) and spelling (/a/ /c/ /k/) as the word you are looking for. Here is a spelling clue."

Hints Based on Existing Sight Vocabulary

If no onset or rime commonalties are found, the system tries to formulate an analogy or morphemic clue. For example, if Vernae successfully constructs a lyric containing the word "sack" during a previous Say Say Oh Playmate session, the word will already be part of her list of known sight words that are stored in an analogy table and a separate morphemic word list. If Vernae has difficulty with the word "Mack" in a later session, the system can use the word "sack" to construct a rime analogy. This strategy becomes more relevant over time as more words are added to the student's personalized sight vocabulary list, which also includes words learned while using other Lyric Reader applications.

Contextual Framework

The contextual framework consists of information concerning the sentences that students read. They can access definitions, sample sentences, similar words, rhyming words, and grammatical information for any word in a song. The information is meant to help children associate semantic information with their knowledge of words. Contextual information also includes sound; the Lyric Reader architecture stores and plays back errors, which allows children to use phonological knowledge as a scaffold to developing orthographical knowledge. Upon hearing the system play "Miss Mary Mack Black Black," students will notice incorrectly placed lyrics, and make the effort to find appropriate substitutes.

The contextual framework's use of a Goal-Based Scenario (GBS) is a Lyric Reader feature that allows for personalizing the program interface.[5] Graphics and language are created following the adaptation of three GBS components (Schank, 1992):

1. Cover story, meaning the background story line that establishes the need for accomplishing a task. To be successful, cover stories must be interesting and intrinsically motivating. For the Lyric Reader system, special effort was put into creating culturally appropriate activities that drew upon minority students' life experiences and interest in rap music.

2. The role that a child plays within the cover story. Depending on the cover story, the student's role must change to be thematically related.

3. The mission that users are encouraged to accept and accomplish. To be effective, the mission must has some sense of realism, while at the same time requiring the use of reading skills to complete it.

A comparison of the cover stories, roles, and missions for Rappin' Reader and Say Say Oh Playmate is offered in Table 5.

Table 5: Rappin' Reader and Say Say Oh Playmate Contexts

	Rappin' Reader	Say Say Oh Playmate
Cover Story	All of the writers at a recording studio have quit, so the studio is in desperate need of writers.	Young kids in a neighborhood clapping troop need to learn how to perform a set of clap routines.
Role	A writer for one of the recording studio's rap artists.	Older member of the clapping troop.
Mission	Get the lyrics to a song printed correctly on a CD cover.	Teach younger girls how to perform a clap routine.

Care must be taken to ensure that the interface for any Lyric Reader application matches the musical genre being used, since an important goal of the architecture is to situate a child in a realistic environment that is also culturally appropriate. For instance, an audition in a recording studio is considered proper for the Rappin' Reader application but not for the clap routines used in Say Say Oh Playmate. Interfaces also include graphics templates with genre-appropriate items for completing the various tasks found in each application.

Comparing Applications

While application graphics differ dramatically, the underlying structure of the two applications is very similar, especially in terms of instructional guidance. Users of Rappin' Reader are asked to "finish the printboard," while Say Say Oh Playmate users are asked to reconstruct clap routines. For each application, children listen to lyrics to become familiar with songs, recreate lyrics to existing songs, construct lyrics for new songs, and listen to performances of original songs and their own creations. Both applications make use of

text-to-speech technology to play back lyrics on demand, which allows students to share their work with teachers, parents, and classmates as part of the performance component.

The primary difference between the programs may be their appeal to different audiences, as expressed by the lyrics and the lived experiences that the lyrics represent. Since rap artists are predominantly African-American males, the targeted population for Rappin' Reader was African-American boys. Likewise, the tradition of clapping games among African-American girls made them the preferred target population for Say Say Oh Playmate (Table 6).

Table 6: Examples of Rappin' Reader and Say Say Oh Playmate Texts

Rappin' Reader	Say Say Oh Playmate
I missed the bus, I missed the bus, I missed the bus, I went to bed late but I didn't think late would affect me! Early came around then late one left me! Wake up wake up so I can get dressed! I guess my body was mad cause I gave it no rest. And when I finally did awaken it was a quarter to eight, Jumped in the shower and knew I was late. Stepped out, put on my jeans and my Ewings, Said to myself "If I miss school I am ruined!" I ran down a hill then I rushed rushed, I ran down a hill trying to catch the bus. Now I'm hoping to myself everything is cool, Standing on my block like a fool.	Miss Mary Mack, Mack, Mack, All dressed in black, black, black. With silver buttons, buttons, buttons All down her back, back, back. She asked her mother, mother, mother For fifteen cents, cents, cents. To see the elephant, elephant, elephant Jump over the fence, fence, fence. He jumped so high, high, high He reached the sky, sky, sky. And he never came back, back, back Until the Fourth of July, 'ly, 'ly. I love coffee, coffee, coffee And I love tea, tea, tea. And I love the boys, boys, boys And the boys love me, me, me.

A closer look at the two programs reveals differences in the tasks that students are expected to perform, especially in the construction of their own songs (Table 7). Rappin' Reader users are given greater freedom in writing lyrics, with the system using objects in the students' illustrations as the basis for prompts. After completing their mission, children can choose from a list of rhythm tracks for background music, and work on recording their songs until they are satisfied with the end product. Say Say Oh Playmate users are required to use an existing song as a template for their original lyrics, which ensures the availability of a rhythm template for constructing a clap routine. As part of this program, children have access to a 1,500-word dictionary indexed according to spelling, rhyme, and category; students can also build personal dictionaries using words that they add to the system.

Table 7: Rappin' Reader and Say Say Oh Playmate Tasks

	Rappin' Reader	Say Say Oh Playmate
Listen	• Listen to a song performed in the Listening Studio.	• Perform a clap routine with Sam the helper.
Reconstruct	• Fill in missing lyrics. Unscramble lyrics. Create a "club" version of a song. Find and fix the printer's spelling errors. Fill in and spell missing words.	• Teach girls to sing a song by organizing leaves. Teach girls to clap a routine by organizing hand prints.
Construct	• Write a parody rap. Write original rap lyrics. Create illustrations for a rap music video. Record rap lyrics.	• Construct a new version of clap lyrics. Record lyrics. Construct new clap routine.
Perform	• See original rap video performed in recording studio.	• See animated girls perform the clap routine.

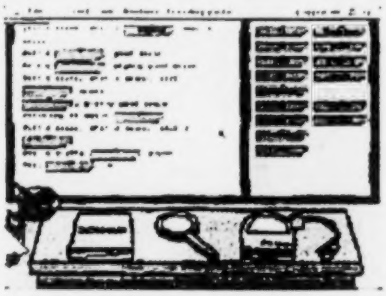
Graphics

Table 8 provides examples of the graphics used in each application. Graphics design was driven in part by task selection, but also by the culture of the target student population. For instance, the graphics for Say Say Oh Playmate reflect the life of an African-American girl living in a housing project. Instead of a large back yard or modern neighborhood playground, the background contains the type of row houses commonly found in large midwestern cities.

Table 8: Examples of Rappin' Reader and Say Say Oh Playmate Graphics

	Rappin' Reader	Say Say Oh Playmate
Helpers		

Table 8: Examples of Rappin' Reader and Say Say Oh Playmate Graphics

	Rappin' Reader	Say Say Oh Playmate
Setting	Interface takes place in the office of a recording studio.	Interface takes place in an urban neighborhood.
		

Lyric Reader Tool Suite

Both applications were created by a programmer was equally familiar with rap music and clapping games, and therefore reflect the cultural heritage shared by the designer and her intended audience. However, to ensure that the Lyric Reader architecture can serve other audiences, tools are being developed that will allow non-programmers to create a broad range of learning environments. A list of potential Lyric Reader applications is presented in Table 9.

When completed, the Lyric Reader tool suite will give teachers and educational software developers the power to develop applications and content that meet the needs of the student populations they are familiar with. Assuming that few developers will have strong pedagogical backgrounds, and that few experienced teachers will have strong programming skills (or the time to create their own applications and content), the tool suite is being designed in a manner that allows for and encourages the creation of contextualized learning environments based on sound teaching principles. Enabling programmers to develop culturally appropriate applications will provide another avenue for studying relationships between culture and the design of effective computer-driven learning environments.

The finished suite will consist of five parts: an engine, content builder, interface constructor, task creator, and tutor. The engine will contain the core pedagogical framework and the Lyric Reader shell created with data added via the other four tools; it is the only component that programmers will not have direct access to. The content builder will be used to create cover stories, roles, and missions, and to enter song lyrics. The purposes of the interface constructor and task creator are self-explanatory. The tutor will enable application designers to match the helper's language (i.e., "Sam" in Say Say Oh Playmate) with the language used by the target group.

To date, three components of the tool suite have been completed (the content builder, engine, and tutor); two others (the task creator and interface constructor) are under development.

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Table 9: Potential Lyric Reader Applications

Title	Folk Reader	Christmas Reader	Rockin' Reader	Spice Girls Reader
User group	Kids who know folk songs.	Kids who know Christmas songs.	Kids who like rock songs.	Kids who like the Spice Girls.
Music/ Content	Folk songs.	Christmas songs.	Rock/alternative pop songs.	Pop songs.
Cover Story	A music teacher needs to leave school for a while to visit her mother, but the class still needs to practice some songs for the school's Fall Concert.	Neighborhood kids want to spread good cheer by caroling, but need help.	A friend is in a garage band and wants to learn a new song from you.	Your friends ask you to direct their performance for your school's talent show.
User's Role	Class leader while the music teacher is absent.	Neighborhood kid.	Someone who wants to help out a friend.	Director.
Mission	Teach the class to perform a song with hand gestures.	Teach your friends to sing a song.	Teach the band a song that you know.	Teach your friends to sing a song and dance.
Setting	A music classroom.	A family room with tree and fireplace.	A garage.	A dance studio.
Guide	The music teacher.	A neighborhood grandma who knows the lyrics.	An older child who also knows the song.	An older girl from who is a talented performer.
Listen	The music teacher performs the song.	The grandma sings the song.	The older kids play the song from a tape.	The older girl helps you watch a Spice Girls video.
Reconstruct	Writing the song's lyrics on the board.	Writing out the song on scraps of wrapping paper.	The older child has written some of the words in a notebook, but the user must fill in the rest.	Pinning the words to the song on a bulletin board.
Construct	Write new songs on the board.	Writing new songs in a song book.	Writing new songs in the notebook.	Writing new songs and pinning their lyrics on the bulletin board.
Perform	Target group performs the songs at the rehearsal.	Neighborhood group performs the songs in rehearsal and at a neighbor's doorstep.	The band performs the song.	Target group performs at the talent show.

Conclusion

This paper contained a detailed description of Lyric Reader, an architecture designed for developing contextualized reading instruction. The architecture allows for the creation of computer-based learning environments for pedagogically sound instruction using familiar and intrinsically motivating material. So far, two Lyric Reader applications have been developed and evaluated—Rappin' Reader and Say Say Oh Playmate. A third application, named Nursery Rhyme Reader, is under development, as is a tool suite that

will allow non-programmers to develop new Lyric Reader programs, tasks, and content.

If computer-based learning environments for contextualized reading instruction can be widely distributed to schools throughout the country, it will be a big step toward the day when all children's cultural capital can be used as scaffolds for learning. Lyric Reader applications may someday be added to the list of teaching tools that are available for helping young learners develop their beginning reading skills. However, further research is needed on creating authoring tools so that programmers and teachers can develop pedagogically sound, culturally appropriate learning environments. Such tools will help establish equal partnerships between educational technology developers and end-users by allowing for the easy creation of customized programs aimed at specific audiences.

Notes

1. See http://www-personal.umich.edu/~pinkard/MEDAL/rapping1.htm for a full description.
2. See http://www.umich.edu/~medal for a full description.
3. The onset and rime strategy consists of breaking up words into beginning (onset) and ending (rime) sounds. In the word "missed," the onset is /m/ and the rime /issed/. See Goswami (1988) for a more detailed discussion.
4. Vernae was able to narrow her choices to this list because they were the only words on the screen that contained the "ack" sound.
5. In this paper, "interface" refers to both graphics and language.

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About CIERA

The Center for the Improvement of Early Reading Achievement (CIERA) is the national center for research on early reading and represents a consortium of educators in five universities (University of Michigan, University of Virginia, and Michigan State University with University of Southern California and University of Minnesota), teacher educators, teachers, publishers of texts, tests, and technology, professional organizations, and schools and school districts across the United States. CIERA is supported under the Educational Research and Development Centers Program, PR/Award Number R305R70004, as administered by the Office of Educational Research and Improvement, U.S. Department of Education.

Mission. CIERA's mission is to improve the reading achievement of America's children by generating and disseminating theoretical, empirical, and practical solutions to persistent problems in the learning and teaching of beginning reading.

CIERA Research Model

The model that underlies CIERA's efforts acknowledges many influences on children's reading acquisition. The multiple influences on children's early reading acquisition can be represented in three successive layers, each yielding an area of inquiry of the CIERA scope of work. These three areas of inquiry each present a set of persistent problems in the learning and teaching of beginning reading:

CIERA INQUIRY 1
Readers and Texts

Characteristics of readers and texts and their relationship to early reading achievement. What are the characteristics of readers and texts that have the greatest influence on early success in reading? How can children's existing knowledge and classroom environments enhance the factors that make for success?

CIERA INQUIRY 2
Home and School

Home and school effects on early reading achievement. How do the contexts of homes, communities, classrooms, and schools support high levels of reading achievement among primary-level children? How can these contexts be enhanced to ensure high levels of reading achievement for all children?

CIERA INQUIRY 3
Policy and Profession

Policy and professional effects on early reading achievement. How can new teachers be initiated into the profession and experienced teachers be provided with the knowledge and dispositions to teach young children to read well? How do policies at all levels support or detract from providing all children with access to high levels of reading instruction?

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